

IDENTIFICATION OF MELOIDOGYNE ACRITA CHITWOOD, 1949
THE COTTON ROOT-KNOT NEMATODE

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Root-knot nematodes (Meloidogyne spp.) are common pests of numerous crops in the temperate and tropical regions of the world. In Florida, three or four species are often found in cultivated fields, home gardens, and nurseries. Other species are parasites of ornamental plants and grasses of lawns and pastures. Identification of species is a part of the work of the Bureau of Nematology.

The primary purpose of this circular is to delineate the characters useful in routine identification of a common species, Meloidogyne acrita. The secondary purpose is to call attention to structures of females of this genus which have been known, but not used for identification in the past.

The genus Meloidogyne Goeldi, 1887 was revised by Chitwood (1) in 1949. The revision included redescriptions of the type species, M. exigua Goeldi, 1887, M. javanica Treub, 1885, M. arenaria Neal, 1889, and M. incognita Kofoed and White, 1919. M. hapla was described as a new species, and M. incognita acrita as a new variety of M. incognita. The latter is now M. acrita (3).

Illustrations by Chitwood included drawings of female heads of M. hapla, M. arenaria, M. javanica, and M. incognita (Figs. 1-4). These drawings show differences in lip profiles which are not discussed in the text. There are also complete body drawings of M. hapla and M. javanica (Figs. 9A and C), but no discussion of differences in body shape. Perineal patterns of all species were illustrated by photographs (Fig. 5 A-F), and perineal patterns were emphasized for identification in the text.

In 1983, the author started examination of about 100 Meloidogyne populations from cultivated fields in Florida, other states and foreign countries. The objective was to evaluate female characters other than perineal patterns for use in routine identification.²

The photographs of perineal patterns (Fig. 5 A-F) were used for preliminary identification, and correlated with the head drawings (Figs. 1-4). Outline drawings of representative complete female shapes were made using egg-producing females.

It was found that all females having perineal patterns like the photographs (Fig. 5 A-F) had lip profiles like the drawings of the respective species (Fig. 1-4). Excretory pore locations in relation to stylet knobs were also as shown in these figures, with no significant differences between individual specimens of any species. It was concluded that these characters are stable and dependable characters for routine identification.

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It was also found that about 98% of the populations examined were mixtures of two or more species, which probably accounts for occasional reports of variation in excretory pore locations.

Complete female body shapes of all species found were highly variable during the first stages after the fourth molt. But if egg-producing females only are considered, complete body shapes are often like, or recognizable variations as those shown in Figs. 8 A-H and 9 A-D.

Females of M. acrita with complete body shapes as shown in Fig. 8 A-H were found in many samples including several from cotton (Gossypium hirsutum). The perineal patterns of these specimens were uniformly like Fig. 5F. Dropkin and King (2) illustrated one of these variations (Fig. 6) as an example of the use of formulae for calculating the volume of M. incognita acrita = M. acrita females.

The characterization of Meloidogyne acrita is as follows: Complete body shapes of egg-producing females are as shown in Fig. 8 A-H, with recognizable variations. Length of body 0.500 to 0.800 mm. Lip profile smoothly rounded without distinct lip annule (Fig. 7). Stylet slightly curved. In lateral view, the excretory pore is nearly opposite the stylet knobs, or about the length of the knobs posterior to them. The perineal pattern has coarse striae in short segments forming a high arch flattened above the tail terminal. The lateral lines are visible as breaks or irregularities, more prominent on one side. Type host Gossypium barbadense (Sea Island cotton), type location Tifton, Georgia, U.S.A.

It is concluded that consideration of lip profiles, excretory pore locations, and complete female body shapes for identification eliminates much of the uncertainty inherent in use of perineal patterns only, even for the five common species discussed. Preliminary search of the literature suggests that these and other female body characters must be used in identification of the approximately 55 other species of Meloidogyne described since 1950.

LITERATURE CITED:

1. Chitwood, B. G. 1949. Root-knot nematodes. I. A revision of the genus Meloidogyne Goeldi, 1887. Proc. Helminthol. Soc. Wash. 16:90-104.
2. Dropkin, V. H., and R. C. King. 1956. Studies on plant-parasitic nematodes homogeneously labeled with Radiophosphorus. Exper. Parasitol. 5:469-480.
3. Esser, R. P., V. G. Perry, and A. L. Taylor. 1976. A diagnostic compendium of the genus Meloidogyne (Nematoda: Heteroderidae). Proc. Helminthol. Soc. Wash. 43:138-150.

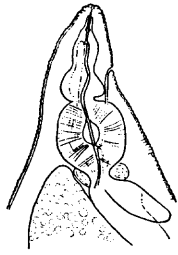


Fig. 1.

Head of M. hapla

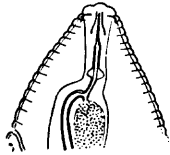


Fig. 2.

Head of M. arenaria

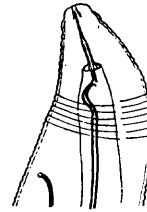


Fig. 3.

Head of M. javanica

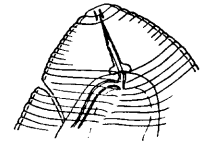


Fig. 4.

Head of M. incognita

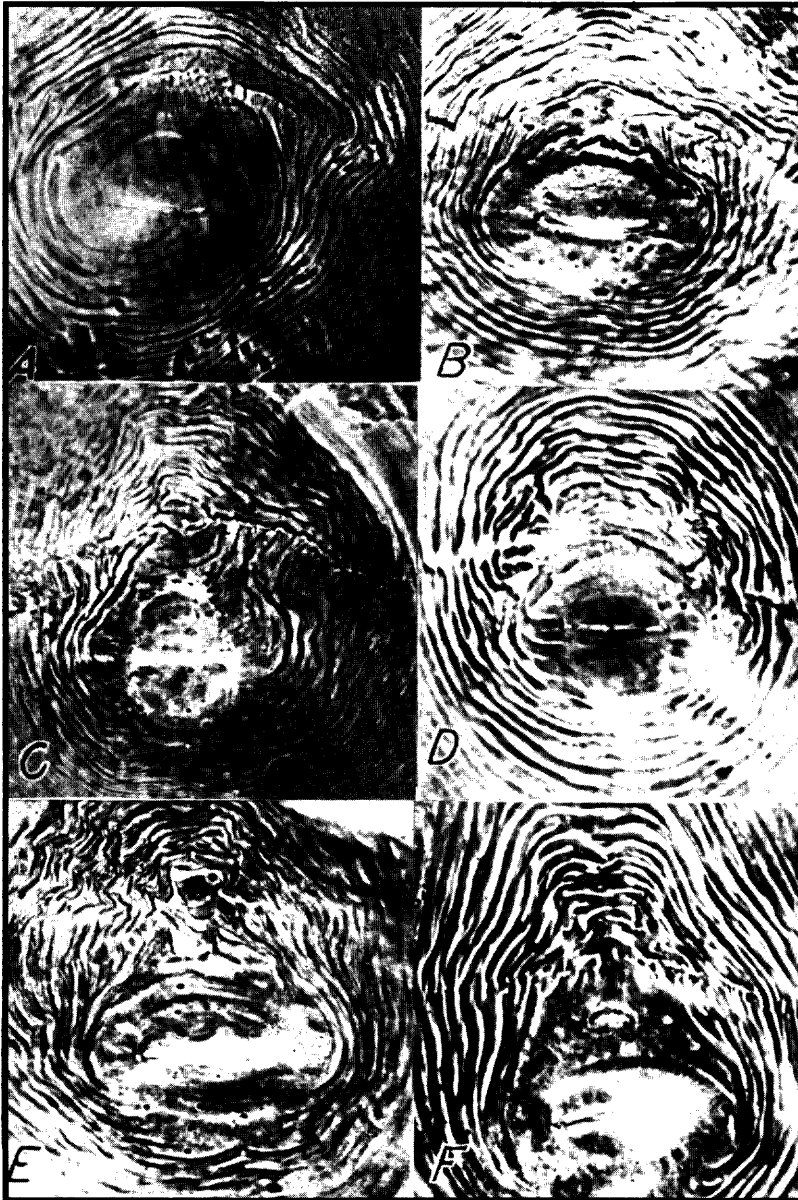


Fig. 5. Photographs of perineal patterns: A, M. hapla B, M. arenaria. C, M. javanica. D, M. exigua. E, M. incognita. F, M. incognita acrita.

FORMULAE SEGMENT

$$V = \frac{2\pi r^3}{3} \quad A$$

$$V = \frac{\pi h}{3} [r_1^2 + r_2^2 + r_1 r_2] \quad B, C, D, E$$

$$V = \frac{\pi r^2 h}{2} \quad F, G$$

$$V = \frac{\pi r^2 h}{3} \quad H$$

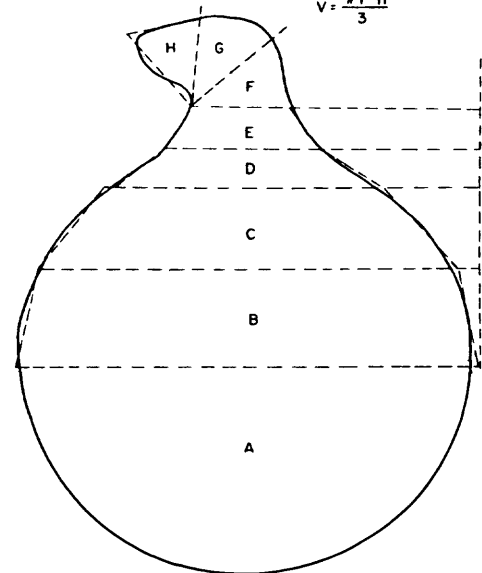


Fig. 6. Full body shape of M. incognita acrita from Dropkin and King (2).

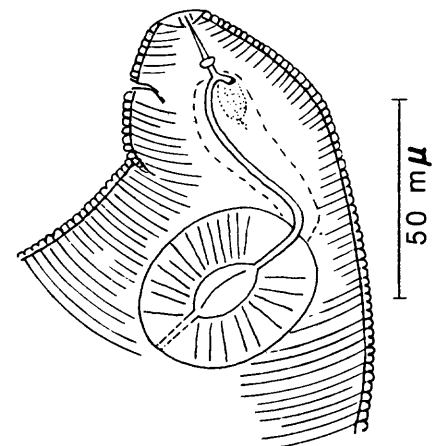


Fig. 7. Head of M acrita.

Note: Illustrations 1,2,3,4,5,9A and 9C are from Chitwood (1).

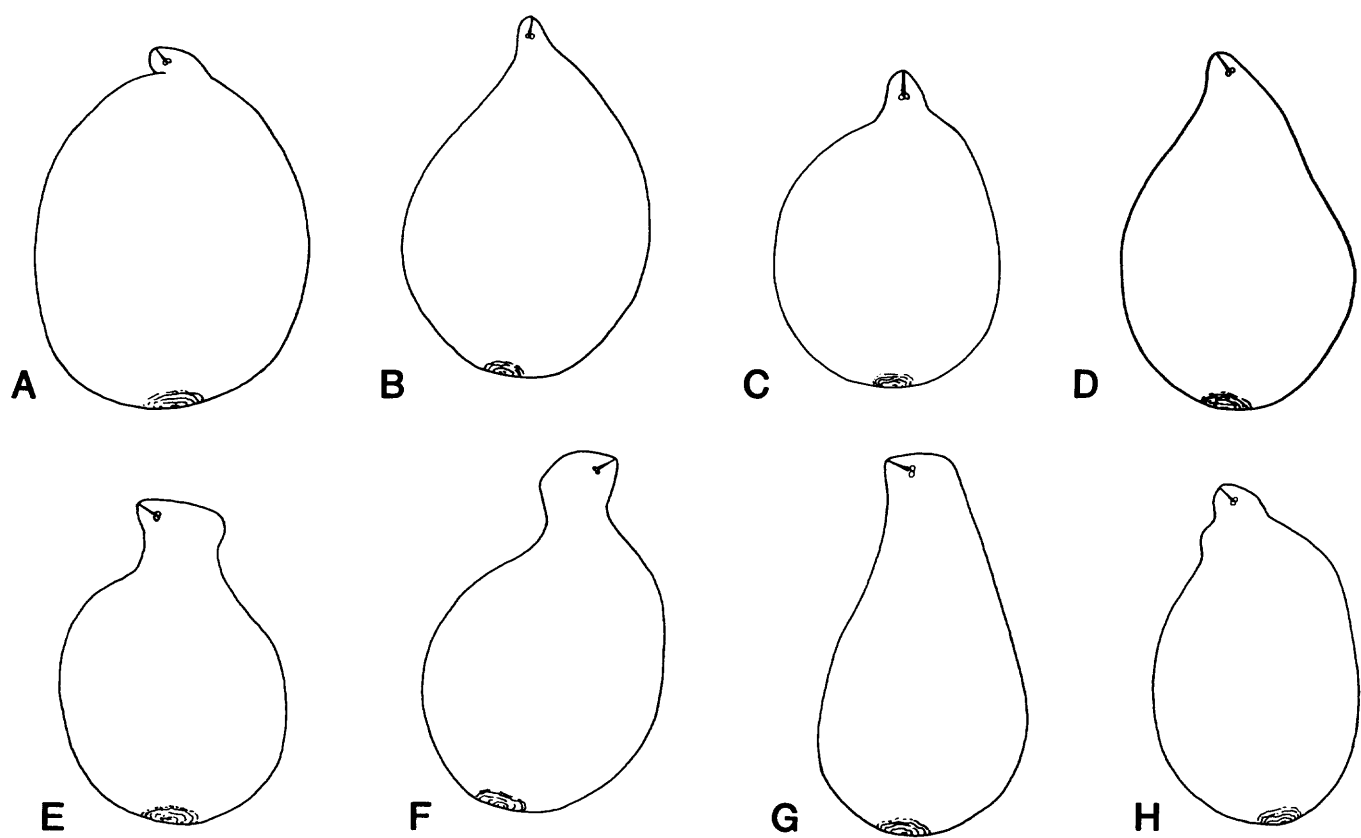


Fig. 8. Full body shapes M. acrita.

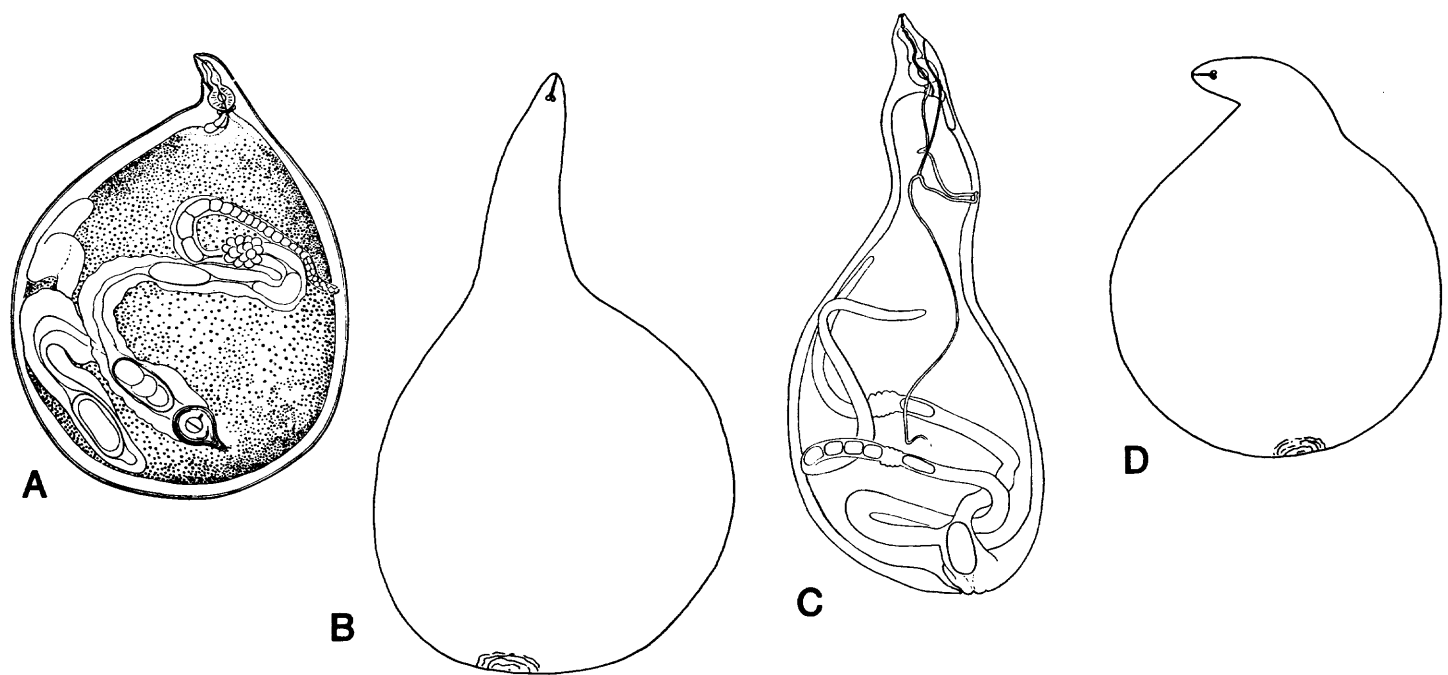


Fig. 9. Full body shapes. A, M. hapla. B, M. arenaria. C, M. javanica. D, M. incognita.